

Installation and operating instructions  
for  
Gyro GY520  
No. F 1244



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You have chosen a precision system with the GY520 gyro. Although the operation of this gyro is easy, the programming does require a basic knowledge by the user. The instructions are written to help you become confident in its use.

Therefore, the instructions must be read and understood before installation and use of the Gyro.

## 1. General

The GY520 gyro is a particularly small and light high performance gyro suitable for all types and classes of helicopters. It is suitable for both, electro, as well as internal combustion (IC) powered helicopters. Due to the use of highly integrated MEMS, (Micro Electric Mechanical System) –Technology, the sensor element and the digital control electronics can all be housed in a compact case.

Fitted with a novel, wear free MEMS-semiconductor-sensor; the gyro has a “soft” feel on the tail rotor, and at the same time having a solid “lock” when needed. The gyro may be operated in normal or in AVCS modes (Active Angular Velocity Control System), which is similar to a Heading - Hold (Lock)-System.

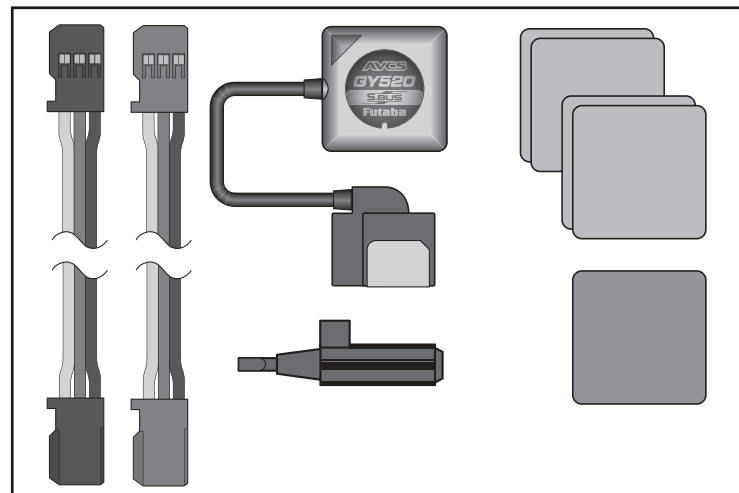
### Note:

In AVCS mode, the pitch to tail mixing (Revo-Mix) is not operable. This is also not absolutely necessary in Normal Mode either.

When the model is disturbed, e.g. side-wind, and in normal mode, the gyro will only try to give a control signal correction only as long as the tail rotor servo is trying to move the tail of the helicopter. As soon as the tail movement has stopped, then the gyro stops trying to correct any unwanted movement of the helicopter.

In AVCS-mode, the gyro will continue to correct the tail position (with a control signal to the servo), until the helicopter returns to its original position.

## 2. Contents



- 1 GY520 gyro
- 1 350 mm red connecting lead
- 1 350 mm black connecting lead
- 2 Double-sided adhesive foam pads 2 mm
- 2 Double-sided adhesive pads 3 mm
- 1 Metal plate damper
- 1 Mini screwdrivers

## 3. Technical Data GY520 Gyro:

Operating voltage:	4,8 - 6 Volt at receiver output
Temperature range:	-15 °C to +45 °C
Weight:	6.9g or 10 g including connectors
Current draw:	40 mA (without servo)
Dimensions:	20,7 x 20,7 x 10,4 mm
Control frequency:	1520 $\mu$ s = 280 Hz, 760 $\mu$ s = 560 Hz
Sensor rate range:	800°/second

## Features:

- Particularly fast reaction due to the High-Speed Microprocessor and the pure digital signal processing and control is faster than the GY401.
- Soft control feel but still having a “hard-lock“.
- Symmetrical rotational rate for left and right
- Detects the smallest angular speed changes.
- “Antistatic-Case material“ protects against electrostatic discharges and interference.
- Very small and light due to use of SMD-Technology

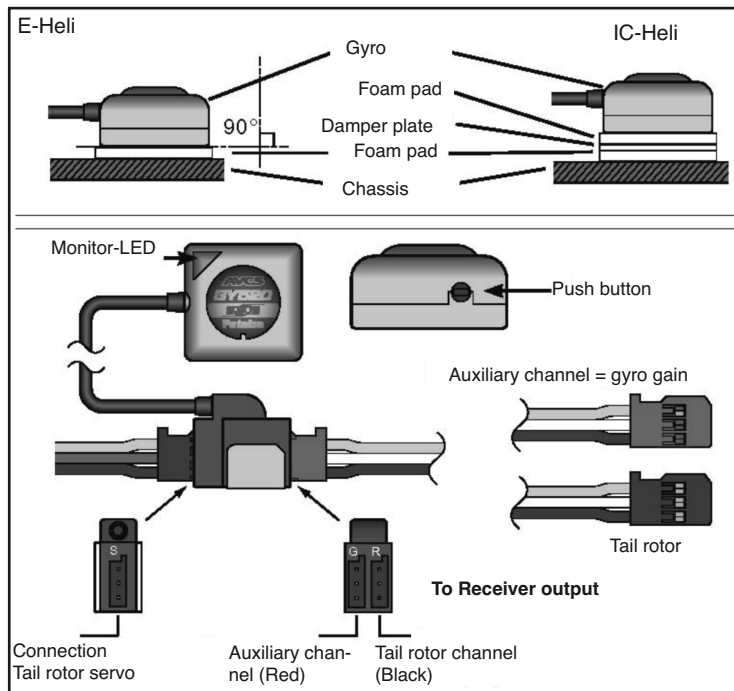
## Functions

- Step less gyro gain adjustment from transmitter (Tx)
- Switchable between Normal- and AVCS Modes from Tx
- Adjustable gain
- Adjustable to suit maximum left and right tail rotor servo throw (Limit).
- Selection of Digital-or Analogue servos
- Selection for Flight style F3C (soft) and 3D (hard)
- Selection of servo neutral position 1520 / 760  $\mu$ s
- LED Monitor to display the current gyro status.
- Programming with a single button on gyro
- Software to program on PC (USB-Adapter required)
- Integrated S-BUS System

## 4. Installation

Attach the supplied foam pads to the gyro case and mount on a vibration-free part of the helicopter chassis. Mount it so that the gyro base is at right angles (90°) to main rotor shaft.

For helicopters with high levels of vibration and IC powered models, the metal damper plate should be mounted on the model with a double-sided foam pad and the gyro mounted to this plate with an additional foam pad.



## 5. Connection (Standard - parallel)

A vibration damped mounting is extremely important, because the MEMS-Sensor will detect the smallest of movement. For electro-helis, we recommend using just the 2 mm Foam-Pads, for IC helis, use 2 of the 3 mm pads plus the damper plate. Take care during the assembly and connection that the gyro case does not touch any other part of the helicopter. The cables must not be under tension or the damping of the gyro will be affected. Take care that the cables cannot transfer any vibration from the Helicopter - Chassis to the gyro.

Secure the cables also.

### 5.1 Connection (S-BUS - serial)

Later and when receivers are available with a serial S-BUS output, it will be possible to connect only the S-BUS lead to the gyro socket "R". The lead to the auxiliary channel will no longer be necessary. The tail rotor servo will continue to be plugged into the "S" socket on gyro.

#### Factory standard settings of the gyro\*

Servo-Mode: -> Digital servo, neutral 1520  $\mu$ s  
Gyro-reverse: -> Normal  
Limit-adjustment: -> 420  $\mu$ s (100%)  
Flight-Mode: -> F3C  
Reaction adjustment: -> Standard

### 6. Operation

The use may begin as soon as a digital servo with neutral point of 1520  $\mu$ s is available.

**Tip:** In this mode, do not use an analogue servo, due to the high frequency; it can damage the servo beyond repair. To connect an analogue servo, first change the servo-mode to Analogue and then you can connect a servo.

- Switch on Tx
- Switch on Rx
- The gyro start sequence begins  
**Tip:** If the LED slowly flashes red, there is no Rx input signal
- Warm up -> LED flashes slowly blue
- Sensor alignment -> LED flashes blue quickly  
During the sensor alignment, do not move the model/gyro for 3-5 seconds!
- After alignment: LED flashes red = AVCS-Mode  
LED blue = Normal Mode

The tail rotor moved 4 times left and right, to signal that the gyro function is now active.

### 7. Programming Menu

The important programming adjustments can be made directly on the gyro without having to connect the gyro to a PC. By using the side mounted "Push" button and the LED-monitor, the following programming adjustments can be made.

Firstly power up the gyro as described above.

#### Activate the programming menu:

Press "Push" button for 3 seconds

#### 7.1 Servo Mode

The gyro switches to program mode, and the flash sequence 1 begins to show and allow programming of the Servo Mode.

LED Status	Program
Single blue flash	Digital servo Neutral 1520 $\mu$ s *
Single red flash	Digital servo Neutral 760 $\mu$ s
Single purple flash	Analogue servo

#### Servo recommendations:

Digital servo 1520  $\mu$ s = S 9254, S 9257, S 9253, BLS 254, BLS 257  
Digital servo 760  $\mu$ s = S 9256, S 9251, BLS 251

When pressing the "Push" button, the LED will flash rapidly, during this time, the program

Selection can be made with repeated pressing of the "Push" button. When programming is completed, the LED will switch to a slow flashing sequence to indicate Display Mode. If the settings are changed, then the colour of the LED will also change. If you need to make further changes to the settings, then the LED colour will also change, then activate the fast flashing mode by pressing "Push" and make any adjustments by using the "Push" button during the fast flashing stage. Paging step-by-step through the various pre-programmed factory settings will make selection of settings. (Digital 1520-> Digital 760-> Analogue -> Digital 1520 etc.)

To reverse gyro sense, press "Push" – button for 3 seconds.

## 7.2 Gyro normal/reverse rotation

As previously described, activate the short flashing sequence and switch to programming mode.

LED Status	Setting
2 x blue flashes	Normal*
2 x red flashes	Reverse

To access the Limit-Setting, press the “Push” button for a further 3 seconds.

## 7.3 Limit-Setting

To avoid damage to the servo if it hits its mechanical limit, release the tail rotor control linkage before programming the servo throw limits. Limit adjust is a separate adjustment of the maximum right and left servo travel. The tail rotor travel is increased by the gyro and is 150% of the “normal” servo travel.

Activate the rapid flashing by quickly pressing the “Push” button, select the left travel by moving the tail stick on the Tx to the left, and press “Push”. Thereafter, move the stick to the right and press “Push” again.

### The LED switches to a triple flash sequence.

After setting the approximate servo travel, re-connect the linkage to make the fine adjustments to servo travel. Press “Push” again and adjust the exact travels for left and right (or reversed).

### Tip:

The servo travel limit settings must be at least 50% each side, otherwise, settings less than 50% will not be stored, and this is to ensure that sufficient servo travel is available to effectively maintain control of the model. If the LED shows red, then the limit value is set lower than 50% and will not be stored.

If The LED lights blue, then the settings are above 50%, correct and will be stored. To make Flight Mode selection, press. “Push” – button for a further 3 seconds.

## 7.4 Flight-Mode

Activate the rapid flash sequence by pressing, “Push” and switch to settings.

LED Status	Setting
4 x blue flashes	F3C - Mode*
4 x red flashes	3D / F3N Mode

In F3C Mode, the gyro has a very precise control of the tail rotor and in 3D-Mode; the priority is to have a quick reaction to the control input made by the tail stick signal. To switch to the control response settings, Press “Push” – button for 3 seconds.

## 7.5 Response-Settings

This menu will adjust the gyro Response-settings.

We recommend the use of “Standard” or “Slow” mode settings for 3D and small electro-helis. For larger and heavy scale models, the “Fast” mode setting is recommended. Try all settings in flight to see which one best suits your flying style and the model

Activate the rapid flash sequence on the LED by pressing, “Push” to switch to settings.

LED Status	Setting
5 x blue flashes	Standard*
5 x red flashes	Fast
5 x purple flashes	Slow

To switch to “Data Reset to factory defaults”, press “Push” – button for 3 seconds.

## 7.6 Data Reset to factory default settings

Activate rapid flashing by pressing “Push” and when flashing, press “Push” 3 x times. The LED flashes “purple” to indicate that the data has been reset to factory default settings.

### The Default Settings are:

Servo-Mode: -> Digital servo, Neutral 1520  $\mu$ s  
Gyro rotation: -> Normal  
Limit-Setting: -> 420  $\mu$ s (100%)  
Flight-Mode: -> F3C  
Response-Setting: -> Standard

To exit the programming menus, switch the power off to the Rx and gyro.

## 8. LED-indicator and Gyro Status

Function	Status	LED Monitor
Start	Initialisation	flashes slowly red
Start	Warm-up	flashes slowly blue
Start	Sensor alignment	flashed quickly blue
Operation	Normal mode (dormant)	blue light
Operation	AVCS-mode (dormant)	red light
Operation	Right hand rotation	flashes quickly blue
Operation	Left hand rotation	flashes quickly red
AVCS Mode	Offset tail neutral point	flashes slowly purple

## 9. Adjust and store the neutral point

The gyro needs to store the tail rotor servo neutral point. Leave the Tx stick in the neutral position.

Then switch the Tx and Rx on. The servo neutral will be automatically stored during the switch on sequence. Each time the radio is switched on, then the Tx stick and trim must be left in the neutral position. The neutral position of the servo will always be correctly stored according to the stick and trim positions during switch-on sequence.

## 10. Setting the Gyro gain

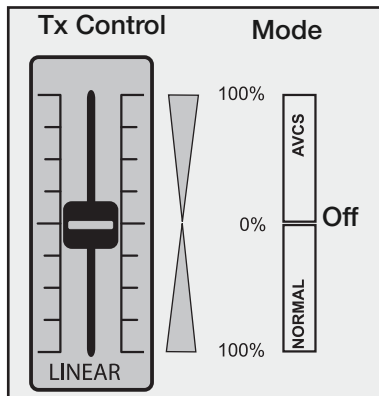
The gyro gain may be adjusted proportionally between 0-100% from the Tx. At 0% gyro gain, the gyro stabilisation is turned off. So that you are able to use the maximum gain, check that the servo does not hit the mechanical limits (see Limit Settings).

When using a robbe/Futaba Tx, the gyro gain uses channel 5. This channel should be a proportional control with a slider or rotary potentiometer. You then have the possibility to adjust the gyro mode and gain in flight to suit flight and a weather conditions.

The Tx control to gyro gain relationship is illustrated in the following diagram.

The control travel is split into two areas. From the middle to the top, the gyro works in AVCS-Mode, between 0- 100%. In the middle, with the gain set to 0%, the gyro is turned off.

## ....Gyro gain



From the mid point to below, the gyro works in Normal-Mode, from 0-100%.

Following this method, and using a linear control, you are able to switch gyro mode and also adjust the gain fully proportionally.

A pulse value of 500  $\mu$ s sets the gain to 100% = ATV/AFR 100%

Naturally, a switch can be used as an alternative to the linear potentiometer, but this will only allow switching between modes. The gain will have to be set by using percentage values in channel 5 ATV or AFR - Menus.

The Tx flight phase programs may also be used to switch different settings on and off. The FutabaT14MZ, T12FG, T12Z, FX-40 and FX-30 systems are set as standard without the gyro channel active.

These radio have a special gyro setting menu, which has the mode as well as gain pre-set and to be switched on or off by a separate switch or flight phase.

If you require the gyro gain to be adjusted by a linear slider, then gyro 1 or 2 must be selected in the function menu. It should be noted that the settings in the menu and control inputs on the slider could work against each other.

Kreisel Heli HR3-120 Grad Schwebeflug 100%									
[ Feinabstimmung ]									
	Status	Typ	Rate	Schalter	Geber	Rate	Mode		
Rate 1	EIN	GY	NOR 70% ( 73%)	L3	LD	+ 15% ( +3%)	Sepa		
Rate 2	AUS	GY	AVCS 75% ( 69%)	L3	RD	+ 15% ( -6%)	Sepa		
Rate 3	INA	GY	AVCS 0% ( 0%)	NULL	NULL	+ 0% ( +0%)	Glob		

Here is an example of the settings required for the tail rotor gain. The menus vary according to the Tx, so please see the individual radio instructions to be able to adjust your own Tx.

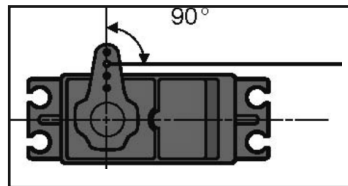
## Recommendations for gyro gain

The correct gyro gain is dependent upon the helicopter model and the servo used. Basically, the higher the quality and speed of the servo, the higher the in flight gain can be set.

## Recommended settings:

With rotor diameter larger than 120 cm Hover 70-100 %, Circuit flying 30-60%, for smaller helis- use lower values. The optimum setting is to use a percentage gain set just before tail-wagging starts.

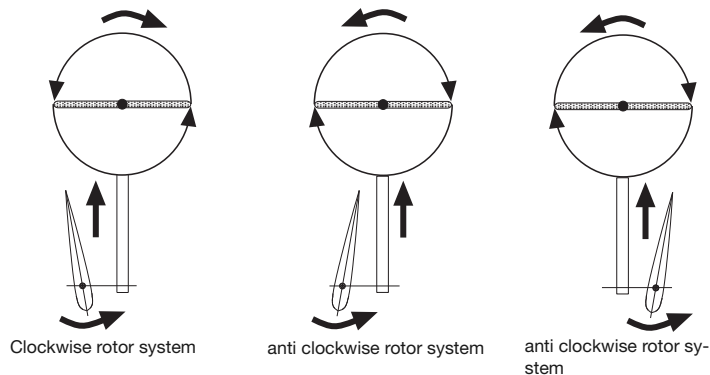
## 11. Tail rotor servo linkage



After turning on the radio, ensure that the servo arm is at 90°/ right angles to the servo case. Choose a servo arm around 15 - 18 mm long and check linkage for no binding, slop-free and light operation.

## 12. Check servo rotation

When moving the Tx tail rotor stick to the left, then check that the tail rotor works according to the sketch. If it works in the opposite control sense, then the direction of the servo must be reversed in the Tx Servo-Reverse menu.

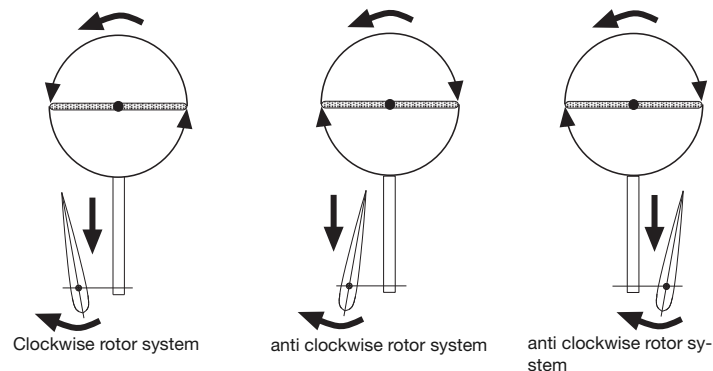


## 13. Check gyro rotation

To be able to check the correct “sense” of the GY520, it needs to be working like a conventional gyro. Therefore, ‘Normal-Mode’ must be turned on in the Tx.

Lift the helicopter up by hand and rotate it quickly to left, the gyro should now control the tail rotor blades as in the sketch. If it works in the opposite direction, then the gyro rotation direction must be reversed in the “Gyro-Rotation” menu

## Gyro rotation



Check the gyro rotation before each take-off

Tip:

**Set tail rotor throws to maximum.**

Take care that correct base set-up of the tail rotor pushrod is made first and then set the throws. Move the tail rotor Tx stick to left and right and set the trim for maximum throw in each direction (Limit - Setting) such that the servo and tail rotor linkages do not reach the mechanical end stops.

During flight, this will prevent overloading and damaging the servo during flight.



## 14. Operating the GY520 in AVCS-Mode

After setting the Normal-Mode, you may now set-up the gyro for AVCS-operation. Set the tail rotor trim to the same value as that used in the Normal-Mode.

To ensure that the Neutral position is identical in Normal and AVCS Modes, one can automatically set the AVCS neutral to the same setting as that used for the Normal-Mode.

### Use the following procedure:

Set the tail rotor stick to the neutral position in Normal Mode, slide the Tx linear slider control (channel 5, gyro sensitivity) 3 x back and forth between maximum and minimum throws (Normal- and AVCS-Modes) within one second to set the gyro to AVCS-Mode.

This method will store the AVCS-Mode neutral position. The monitor will make a rhythmic single flash. This position will be stored when switching on again.

### Special case:

To be able to lift-off in AVCS-Mode in the neutral position and also to recall the set value, move the tail rotor stick from left to right 3 x within 1 second. The servo will then move to its programmed neutral position.

Check whether all Tx settings (Idle up, flight phase switch etc.) are correctly programmed and stored by the LED display.

**Should the LED flash slowly purple, then the tail rotor trim position has been moved for this flight phase.**

Return the trim lever to its correct position.

Start the Motor, hover and fly in AVCS-Mode and adjust the gain according to the above-described methods. Check in AVCS-Mode that the gain is set lower than in Normal-Mode.

### Note:

We would like to point out that the automatic that the automatic storage of the neutral point in AVCS-Modus, (3 x movement of the auxiliary channel within one second), can sometimes lead, in unfavourable interference conditions, can lead to an incorrect setting. The resulting wrong setting of the tail rotor neutral point can lead to a poor or uncontrollable control of the tail rotor.

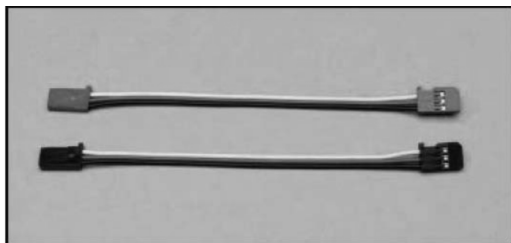
We therefore recommend that you only use a PCM or 2,4 GHz Rx to avoid this effect.

Should a PPM (FM) - System nevertheless be used, it is very important to ensure that the system has an excellent range.

This particularly important when in flight, where some manoeuvres, which cause a dramatic change in the aerial position, such as the stall turn, which will highlight a poorly aligned (particularly when mixers are in operation) RC – System's range limit.

A corrupt radio signal can, under these extreme conditions, lead to a command being interpreted by the gyro to move the servo neutral point.

## 15. Accessories



### Rx connector lead GY520

The Rx connector lead for the GY520 has a double male plug. This has the advantage that, when using the gyro in different size helicopters, the correct length of lead can be selected for the installation.

### Following leads are available as accessories:

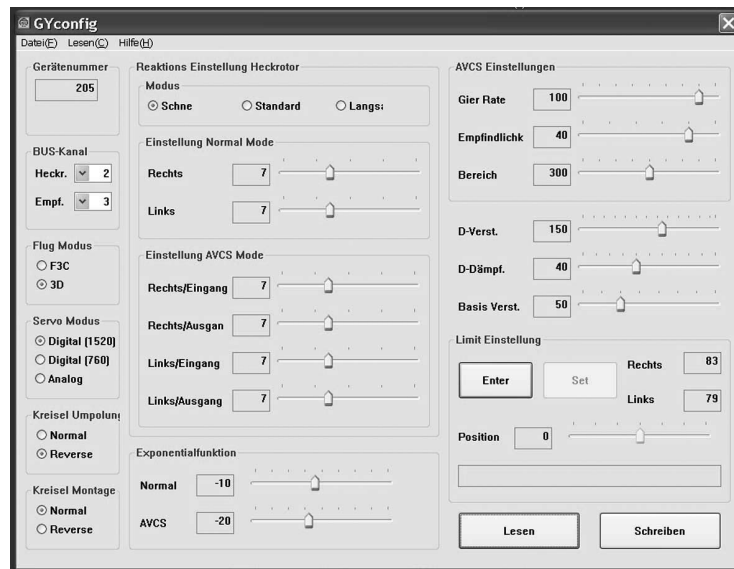
- No. 4090 Connector lead GY520 red and black 65 mm
- No. 4091 Connector lead GY520 red and black 90 mm
- No. 4092 Connector lead GY520 red and black 140 mm
- No. 4093 Connector lead GY520 red and black 215 mm



### USB-Adapter CIU-2 No. F 1405

Adapter to adjust Servo, Speed Control and Gyro parameters with PC-Software.

For Windows Vista/XP/2000 operating systems.



### Software for GY520 gyro

Software for GY520 gyro may be found in the Download area of the robbe-Service-Center on the robbe Homepage. The software allows easy configuration and programming of the gyro to be made.  
<http://www.robbe.com/rsc/html/downloads.htm>

The programming and settings for different models can be stored as separatedata files on your PC.

For this, then the USB-Adapter No. F 1405 is necessary. Suitable drivers for Windows Vista/XP/2000 operating systems area also available to download on the robbe website.

## 16. After life disposal



This symbol means that you must dispose of electrical and electronic equipment separately from the general household waste when it reaches the end of its useful life.

Take your equipment to your local waste collection point or recycling centre. This applies to all countries of the European Union, and to other European countries with a separate waste collection system.

## 17. Declaration of Conformity

robbe Modellsport GmbH & Co. KG hereby declares that this product satisfies the fundamental requirements and other relevant regulations contained in the appropriate CE directives. The original Conformity Declaration can be viewed on the Internet under [www.robbe.com](http://www.robbe.com): click on the logo button marked "Conform" which is included in each device description.



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[www.robbe.com](http://www.robbe.com)

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## 18. Guarantee

Naturally we guarantee this gyro for the statutory period of 24 months. If you believe you have a valid claim under guarantee, please contact your dealer in the first instance, as he is responsible for processing guarantee claims.

During this period we will correct any operating faults, production defects and material faults which arise, at no charge to you. We will not entertain any claims beyond these terms, e.g. consequent damage. Goods must be sent to us carriage-paid; we will pay return carriage. Goods sent without pre-paid carriage will not be accepted.

We accept no liability for transit damage and the loss of your shipment; we therefore recommend that you take out suitable insurance to cover these risks. Send the unit to the Service Centre responsible for your country.

The following conditions must be fulfilled if we are to process your guarantee claim:

- Send proof of purchase (till receipt) with your shipment.
- The unit must have been used in accordance with the operating instructions.
- The unit must have been operated with the recommended power sources and genuine robbe accessories.
- The unit must not exhibit damage due to damp, unauthorised intervention, excessive voltage, overload conditions or mechanical stress.
- Please include a concise, accurate description of the fault or defect, as this helps us locate the problem quickly.

## 19. Service Centre Addresses

Country	Company	Street	Town	Telephone	Fax	E-Mail
Andorra	Sorteney	Santa Anna, 13	AND-00130 Les escales-Princip. D'Andorre	00376-862 865	00376-825 476	sorteny@sorteny.com
Denmark	Nordic Hobby A/S	Bogensevej 13	DK-8940 Randers SV	0045-86-43 61 00	0045-86-43 77 44	hobby@nordichobby.com
Germany	robbe-Service	Metzloser Str. 36	D-36355 Grebenhain	0049-6644-87-777	0049-6644-87-779	hotline@robbe.com
England	robbe-Schlüter UK	LE10-UB	GB-LE10 3DS Leicestershire	0044-1455-637151	0044-1455-635151	keith@robbeuk.co.uk
France	S.A.V Messe	6, Rue Usson du Poitou, BP 12	F-57730 Folschviller	0033 3 87 94 62 58	0033-3-87 94 62 58	sav-robbe@wanadoo.fr
Greece	TAG Models Hellas	18,Vriullon Str.	GR-14341 New Philadelfia/Athen	0030-2-102584380	0030-2-102533533	info@tagmodels.gr
Italy	MC-Electronic	Via del Progresso, 25	I-36010 Cavazzale di Monticello C.Otto (VI)	0039 0444 945992	0039 0444 945991	mcelec@libero.it
Netherl. / Belgium	Jan van Mouwerik	Slot de Houvelaan 30	NL-3155 Maasland	0031-10-59 13 594	0031-10-59 13 594	van_Mouwerik@versatel.nl
Norway	Norwegian Modellers	Box 2140	N-3103 Toensberg	0047-333 78 000	0047-333 78 001	per@modellers.com
Austria	robbe-Service	Puchgasse 1	A-1220 Wien	0043-1259-66-52	0043-1258-11-79	office@robbe.at
Sweden	Minicars Hobby A.B.	Bergsbrunnagatan 18	S-75323 Uppsala	0046-186 06 571	0046-186 06 579	info@minicars.se
Switzerland	Servicecenter Hässig	Baslerstrasse 67 a	CH-4203 Grellingen	0041-61-741 23 22	0041-61 741 23 34	info@robbeufutaba-service.ch
Slovak Rep.	Ivo Marhoun	Horova 9	CZ-35201 AS	00420 351 120 162		ivm2000@seznam.cz
Spain	robbe-Service	Metzloser Str. 36	D-36355 Grebenhain	0049-6644-87-777	0049-6644-87-779	hotline@robbe.com
Czech Rep.	Ivo Marhoun	Horova 9	CZ-35201 AS	00420 351 120 162		ivm2000@seznam.cz